

PROCEEDINGS
OF
THE ROYAL SOCIETY.

1830-1831.

No. 7.

November 17, 1831.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,
President, in the Chair.

The following Papers were read. The first was entitled, "Researches in Physical Astronomy—'On the Theory of the Moon,'" By J.W. Lubbock, Esq. V.P. and Treasurer of the Royal Society.

This paper is a continuation of the author's former paper on the same subject, in which he gives the developments which are required in the second approximation, or that in which the square of the disturbing force is retained.

The author has not yet attempted to obtain numerical results, but he considers this method of solution equally advantageous with the method hitherto adopted, and that the calculation which would tend to perfect the tables of the moon is a desideratum in physical astronomy.

The author has obtained numerical results in the first approximation; the value of the variation agrees within a few seconds with the result of Newton in the third volume of the *Principia*.

The next paper was entitled, "On the Tides," by the same.

This paper contains tables of the results of observations made at Brest, with regard to the principal inequality of the tides, or that which is independent of the parallax and declinations of the moon and sun, and depends solely on the moon's age, that is, on the time of her passage through the plane of the meridian; from which it appears that the tables of the tides for London are not applicable to Brest, by merely changing the *establishment*, that is, by adding a constant quantity, as has been hitherto supposed; and the same remark applies to any distant parts.

The third paper was entitled, "On the Structure of the Human Placenta and its connection with the Uterus." By Robert Lee, M.D. F.R.S. Physician to the British Lying-in Hospital.

In the year 1780 Mr. John Hunter presented a paper to the Royal Society, in which he laid claim to the discovery of the true structure of the placenta, and of its vascular connections with the uterus. From

the appearances which he observed in a preparation of the gravid uterus, after both the veins and arteries had been injected, and a longitudinal incision made through the anterior parietes of the uterus where the placenta adhered to its internal surface, he was led to conclude that the arteries which are not immediately employed in conveying nourishment to the uterus go on towards the placenta, and proceeding obliquely between it and the uterus, pass through the decidua without ramifying; and that just before entering the placenta, after making two or three spiral turns, they open at once into its spongy substance. The corresponding veins he represents as commencing from the spongy substance of the placenta by wide mouths, and after passing obliquely through the decidua, entering the substance of the uterus and immediately communicating with the proper veins of that organ. Dr. William Hunter's description of the same vessels accords with that of his brother. He regards the placenta as consisting of two distinct parts, namely, an umbilical portion which belongs to the foetus, and a uterine portion, which belongs to the mother, each having its peculiar system of arteries and veins; and he supposes that while, in the foetal portion, the arteries and veins form continuous canals, these two sets of vessels communicate, in the uterine portion, by the intervention of cells, into which the arteries terminate, and from which the veins begin.

The subject was afterwards investigated by Noortwyck, Røederer, and Haller, but without any satisfactory result; and the doctrines laid down by the Hunters were generally acquiesced in by subsequent anatomists.

The author of the present paper having had opportunities of examining six gravid uteri, and many placentaë expelled in natural labour, finds reason to conclude that no cellular structure, such as that described by Dr. Hunter, exists in the human placenta, and that there is no connection between this organ and the uterus by great arteries and veins. He thinks himself warranted in concluding that the placenta does not consist of two portions, maternal and foetal, but that the whole of the blood sent to the uterus by the spermatic and hypogastric arteries, except the small portion supplied to its parietes and to the membrana decidua by the inner membrane of the uterus, flows into the uterine veins or sinuses; and after circulating through them, is returned into the general circulation of the mother by the spermatic and hypogastric veins, without entering the substance of the placenta. Such have been the results of the author's own examinations of the structure of the gravid uterus, both when injected and uninjected; and also of an examination of the preparations of that organ, contained in the Hunterian Museum at Glasgow, made at his request by Dr. Nimmo. These views are also corroborated by the careful examination by the author of a preparation of the uterus with the placenta adhering to its inner surface, in the Museum of the Royal College of Surgeons of London, which is supposed to have been put up by Mr. Hunter himself nearly fifty years ago. The cellular structure of the placenta has been too hastily inferred from the masses of wax found interspersed

in its substance, after the vessels have been injected; but this appearance the author ascribes wholly to extravasation in consequence of rupture of the vessels.

November 24, 1831.

JOHN WILLIAM LUBBOCK, Esq. V.P. and Treasurer,
in the Chair.

A paper was read, entitled, "Facts adduced in refutation of the assertion that the Female Ornithorhynchus Paradoxus has Mammæ." By Sir Everard Home, Bart. F.R.S.

The author, after a minute examination, in which he was assisted by Mr. Hartshorn and Mr. Bauer, of three specimens of female ornithorhynchi sent to him by Governor Darling, could not discover mammæ, although these parts are represented as existing by Professor Meckel.

A paper was next read, entitled, "On an Inequality of long Period in the Motions of the Earth and Venus." By George Biddell Airy, A.M. Plumian Professor of Astronomy and Experimental Philosophy in the University of Cambridge.

The author had pointed out, in a paper published in the Philosophical Transactions for 1828, on the corrections of the elements of Delambre's Solar Tables, that the comparison of the corrections of the epochs of the sun and the sun's perigee, given by the late observations, with the corrections given by the observations of the last century, appears to indicate the existence of some inequality not included in the arguments of those tables. As it was necessary, therefore, to seek for some inequality of long period, he commenced an examination of the mean motions of the planets, with the view of discovering one whose ratio to the mean motion of the earth could be expressed very nearly by a proportion of which the terms are small. The appearances of Venus are found to recur in very nearly the same order every eight years; some multiple, therefore, of the periodic time of Venus is nearly equal to eight years. It is easily seen that this multiple must be thirteen; and consequently eight times the mean motion of Venus is nearly equal to thirteen times the mean motion of the earth. The difference is about one 240th of the mean annual motion of the earth; and it implies the existence of an inequality of which the period is about 240 years. No term has yet been calculated whose period is so long with respect to the periodic time of the planets disturbed. The value of the principal term, calculated from the theory, was given by the author in a postscript to the paper above referred to. In the present memoir he gives an account of the method of calculation, and includes also other terms which are necessarily connected with the principal inequality. The first part treats of the perturbation of the earth's longitude and radius vector; the second of the perturbation of the earth in latitude; and the third of the perturbations of Venus depending upon the same arguments.

The computations of the quantities themselves being effected by means of algebraical equations of great complexity, and of numerical calculations of considerable length, which afford in themselves no ready means of verifying their accuracy, the author has been under the necessity of examining closely every line of figures before he proceeded to another. Upon the whole he is certain that there is no error of importance in the numbers he obtained; and that the only probable source of error is the inevitable rejection of figures beyond a certain place of decimals.

In concluding this investigation, the most laborious, probably, that has yet been made in the planetary theory, he remarks that the term in question is a striking instance of the importance to which terms, apparently the most insignificant, may sometimes rise. As an illustration of the magnitude of the errors which might under other circumstances have arisen from the neglect of this term, he further observes, that if the perihelion of Venus and the earth had opposite longitudes, and if the line of nodes coincided with the major axis, the eccentricities and inclination having the same values as at present, the coefficient of the inequality in the epoch would be $8''.9$, and all the other terms would be important. A very small increase of the eccentricities and inclination would double or treble these inequalities.

Anniversary Meeting, Nov. 30.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,
President, in the Chair.

The President delivered the following Address:—

Gentlemen,

The period, provided by our Statutes, has again come round, when your Officers and Council must be reconstituted by your authority; and I feel myself called upon, in conformity with the custom which has been sanctioned by my predecessors, to address you upon such subjects connected with the Royal Society and its administration, as the events of the last year may have rendered proper to be noticed by me. But before I touch upon other topics, I feel anxious to say a few words upon my own position in the Society, and my views respecting it.

The Chair of the Royal Society has been filled by a rare succession of illustrious men, and I feel proud that I have been judged worthy, upon any grounds, to occupy a situation which has become dignified by its association with the names of those who have conferred so much honour upon our country. It is indeed true that I can enter into no competition with such predecessors, as respects scientific knowledge, which my early education, my public occupations, and even the duties of my rank, have prevented me from cul-

tivating and attaining to that extent I could have wished: but I should do no honour to your kindness, which has placed me in this high and dignified station, if I should profess that I considered myself wholly inadequate to the efficient discharge of many at least of its public duties, or that I felt my occupation of this Chair was likely to prove injurious either to the credit of the Society, or to the advancement of science. If such, indeed, Gentlemen, were my own persuasion, I would not continue to fill this honourable post for another hour.

The ostensible duties, in fact, of your President, are chiefly ministerial: he is your organ to ask and to receive your decisions upon the various questions which are submitted to you; and he is your public voice to announce them. Though he presides at the meetings of your Council, he possesses but one voice among many; incurring an equal responsibility in common with every one of its members. He is your official representative in the administration of the affairs of the British Museum: he presides in your name, by virtue of your election of him, at the Board of Visitors of the Royal Observatory, as appointed by His Majesty's Warrant: he is your medium of communication with public bodies, and with the members of the Government upon the various subjects important to the interests of science, which are either submitted to your consideration, or which are recommended by you, through your Council, for the consideration of others. For many of those functions I feel myself to be somewhat prepared by my habits of life, as well as by my public occupations: and for some of them more especially, if I may be permitted to say so, by that very rank in which Providence has placed me as a member of the Royal Family of this country; for though it would be most repugnant to my principles and my wishes that the weight of my station should in any way influence the success of an application which it was either improper to ask or inexpedient to grant, I should feel it to be equally due to the dignity of this Society and to my own, that the expression of your opinions and of your wishes should experience both the respect and the prompt attention to which it is so justly entitled.

But while I should consider it my duty to exert the just authority of an English Prince in the assertion of your rights, and in the promotion of the success of those objects which you may intrust to my advocacy without these walls, yet within them I trust that I never have made, and that I never shall make use of it, either for the promotion of party purposes, or for the suppression of the candid, free and unbiassed expression of your opinions. In this Chair I appear as the Official Head of a Society comprising a great majority of the most distinguished men in science and in literature within the Three Kingdoms, and in this character alone I wish to be recognised; and it is my most anxious desire to witness around me the free expression and interchange of opinions, subject to no restraints but such as are requisite for the regularity and well government of every numerous and mixed society.

I do not think it necessary, Gentlemen, to apologize to you for thus enlarging upon topics, which, though personal in some respect to myself, cannot be altogether destitute of interest to you; inasmuch as it undoubtedly concerns you to understand distinctly the principles by which I have regulated my conduct hitherto whilst filling this Chair, and to which I shall continue to adhere in case I should be honoured by being re-elected to it. And I am the more anxious that they should be generally known, in consequence of some circumstances which attended my election last year. If any angry or uneasy feelings were called forth upon that occasion, I can assure you that I do not, nor ever did, partake in them; and it would be a source of the most heartfelt pride to me if I could witness their entire extinction in a cordial cooperation amongst all our members to promote the advancement of science and the common honour of our country; to fulfil, in short, the solemn obligation imposed upon us individually and collectively by our charter, to promote the good of the Royal Society, established for the advancement of natural knowledge, and to pursue the ends for which it was originally founded.

Having ventured to say thus much upon a subject of some delicacy, though in no respect painful to myself, I trust that I may be permitted to add a few words more upon another topic which is nearly connected with it, and which is to express my respect for the accomplished philosopher to whom I had the honour, I will not say misfortune, to find myself opposed last year. His name has been familiar to me from my earliest years, for it is that of one whom my Royal Father delighted to patronize, and which is inscribed in imperishable characters upon the great monuments of the universe, the knowledge of which he contributed so greatly to extend. I knew that venerable man when full of years and of honour, and I can well conceive the feelings of placid triumph and pride with which he must have contemplated the rising promise of his son. What the maturer fruits of that early promise have been, it is not necessary for me to state when addressing the members of this Society: it is sufficient to say, that there is no one among the most illustrious men of England whom the concurrent voice of his countrymen would have pointed out as more worthy of the distinguished and peculiar mark of royal favour and approbation which he has so recently received than Sir John Herschel. Towards such a man I can entertain no feelings but those of admiration, respect and goodwill, and which I trust, if fed by a more intimate acquaintance, will ultimately lead to those of sincere friendship.

The labours of your Council during the past year have been more than commonly important, and have been directed to objects which deeply concern the welfare, good government and general utility of our establishment. For the particulars of those labours I must refer you to the Report which has been so ably drawn up by one of your Secretaries, Dr. Roget, and which will be read to you by him at the conclusion of this Address. I trust, however, that in one particular

I may be excused if I trespass upon the province of that Report; if with the natural partiality of an affectionate brother and a loyal subject, I venture to record the gracious expressions of His Majesty when he inscribed his Royal Name in our Charter-book as the Patron of the Royal Society, in the presence of the Council. His Majesty then declared his gracious intention of continuing the same protection to this Society which had been extended to it by his royal predecessors; that His Majesty had learnt from the professional pursuits of his early life to estimate the immense benefits which science had conferred upon this country in particular, and upon the world in general, by perfecting the art of navigation; that it had produced similar effects upon all the arts of life, however apparently remote from the source from which they flowed; that the progress of civilization amongst nations was generally coextensive with the improvements in science and the extent of its practical application; and that His Majesty should feel it to be his duty, as the Sovereign of these Kingdoms, to aid by his encouragement the exertions of the Royal Society to fulfil the great objects of its foundation. His Majesty concluded by recommending us in strong terms to cultivate friendly relations with the great scientific establishments of other countries, with a view to the free and liberal interchange of knowledge and discoveries. And here allow me, Gentlemen, to pause for a moment, with a view to remark that our Gracious Sovereign, in giving us this wholesome admonition relative to foreign scientific bodies, meant in a most delicate and dignified way, silently to convey to us his royal and paternal pleasure and advice as to the harmony and friendly intercourse which he wished us to maintain with all our national institutions, and more particularly amongst ourselves. Such sentiments, Gentlemen, are worthy of a King of England: and permit me further to observe, that it affords me additional pride and satisfaction that circumstances should have combined together so fortunately as to have made me the organ of such gracious communications between our Royal Patron and the Royal Society.

The Council, upon the same occasion, had the honour of presenting, in the name of the Society, a dutiful and loyal Address to Her Majesty the Queen, who most condescendingly received them, and most graciously declared her intention of extending her support and protection to the Royal Society.

The list of Fellows whom the Society has lost during the last year is more extensive than usual, and the time will not allow me more than to take a brief and passing notice of some of them, whose labours have brought them into a more immediate connection with this Society and the great objects which it proposes to pursue.

Mr. Abernethy was one of those pupils of John Hunter who appears the most completely to have caught the bold and philosophical spirit of investigation of his great master. He was the author of various works and memoirs upon physiological and anatomical or surgical subjects, including three papers, which have appeared in our Transactions. Few persons have contributed more abundantly

to the establishment of the true principles of surgical or medical practice in those cases which require that minute criticism of the symptoms of disease, upon the proper knowledge and study of which the perfection of medical art must mainly depend. As a lecturer he was not less distinguished than as an author; and he appears to have possessed the art of fixing strongly the attention of his hearers, not less by the just authority of his opinions, than by his ready command of apt and forcible illustrations. He enjoyed during many years of his life a more than ordinary share of public favour in the practice of his profession; and though not a little remarkable for the eccentricities of his manners and an affected roughness in his intercourse with his ordinary patients, he was generally kind and courteous in those cases which required the full exercise of his skill and knowledge, and also liberal in the extreme when the infliction of poverty and privation was superadded to those of disease.

Captain Henry Foster was a member of the profession which, under all circumstances, is so justly celebrated for activity and enterprise, and which, when wanting the stimulus of war, has on many occasions lately distinguished itself by the zealous and successful cultivation of those studies and the practice of those observations which are so essentially connected with the improvement of navigation. He accompanied Captain Basil Hall, in the *Conway*, in his well-known voyage to South America, and assisted him materially in his pendulum and other observations. He afterwards joined Captain Parry in the second of his celebrated voyages; and at Port Bowen and other stations within the Arctic Circle, he made, with the assistance of Captain Parry and others, a most valuable and extensive series of observations upon the diurnal variation, diurnal intensity and dip of the magnetic needle, and upon other subjects connected with terrestrial magnetism and astronomical refractions, which formed an entire fourth part of our *Transactions* for 1826, and was printed at the especial expense of the Board of Longitude. For these papers he received the Copley Medal; and the Lords of the Admiralty acknowledged their sense of the honour which was thus conferred upon the profession to which he belonged, by immediately raising him to the rank of Commander, and by appointing him to the command of the *Chanticleer* upon a voyage of discovery and observation in the South Seas. It was during the latter part of this voyage that he perished by an unfortunate accident; but I am happy to say that the public is not likely to lose altogether the benefit of his labours, and that he has left behind him an immense mass of observations of various kinds, which the Lords of the Admiralty have confided partly to this Society, and partly to the Astronomical Society, with a view to their publication in such a form as may best serve the interests of science, and may most tend to establish the character and fame of their lamented author.

The Reverend Fearon Fallows was a distinguished cotemporary of Sir John Herschel at Cambridge, and throughout his life an ardent cultivator of astronomical science. In the year 1821 he was

appointed Astronomer Royal at the Cape of Good Hope, to which place he immediately proceeded, though provided only with a small transit and an altitude and azimuth instrument, a clock, and a few other absolutely necessary appendages of an observatory. In the course of the two following years he completed a catalogue of 273 southern stars, which was published in our Transactions for 1824. The delays which subsequently took place in the building of the observatory, which was not completed before 1828, and the want of those capital instruments which were required to put it into complete operation, although they did not interrupt or check either the industry of his research or the accuracy of his observations, yet by making them necessarily imperfect, deprived them of a very considerable part of their value.

When the mural circle at last arrived, and when he at length imagined himself in possession of the means of effecting the great object of his ambition, by making the catalogues of the stars of the southern hemisphere rival, in accuracy and completeness, those of the northern, he found new difficulties meeting him in the derangements occasioned in so large an instrument, by embarking, disembarking, and fixing it, thus producing errors which were nearly irremediable in the absence of the original maker, or of any superior artist. In the midst of these harassing discouragements he was attacked by severe illness, and at the same time deprived of his assistant by a similar cause, yet even under these afflictions he continued true to his duty; and in a letter to one of his friends a short time before his death, he describes himself as being carried daily in a blanket by his servants from his sick room to the observatory for the purpose of winding up his clocks and chronometers. His disease at last assumed the form of an incurable dropsy, and he died a short time before his intended embarkation for England, whither at last he had reluctantly consented to return, when his recovery at the Cape was pronounced to be hopeless.

In the course of the year 1829 he made, in conjunction with Captain Ronald and Mr. Johnstone, a very complete series of pendulum observations, which were published in our Transactions for the year 1830: and the Lords of the Admiralty are in possession of a very extensive series of astronomical observations made during the last seven years of his life, which it is to be hoped that, before long, they will cause to be given to the public.

Lieutenant Colonel Macdonald, son of the celebrated Flora Macdonald, besides many professional and other works, was also the author of two papers in our Transactions for the years 1796 and 1798, containing observations upon the diurnal variation and dip of the magnetic needle made at Fort Marlborough in Sumatra, accompanied likewise by some observations upon their causes.

Mr. Thomas Greatorex, the well-known musician, was the author of a paper on the measurement of the heights of mountains. He was a person of great modesty and simplicity of character, and possessed a knowledge of some branches of mathematics and of natural

philosophy which is rarely met with in the members of his profession.

Sir Thomas Frankland, as long ago as the year 1795, was the author of a short paper in our Transactions on the welding of cast steel and iron.

Mr. Wm. Strutt of Derby was the author of those great improvements in the construction of stoves, and in the economical generation and distribution of heat, which have of late years been so extensively and so usefully introduced in the warming and ventilation of hospitals and public buildings. He possessed a very great knowledge of practical mechanics, and employed himself through the whole course of a very active life in the furtherance of objects of public utility.

Dr. Parkinson, Archdeacon of Leicester, gained the highest honours at Cambridge, and was the author of a treatise on mechanics. In his early life he was employed, in conjunction with Israel Lyons and others, in the formation of the tables requisite to be used with the Nautical Almanac.

Dr. Sims was a very zealous cultivator of botanical science, and continued for many years the publication of Curtis's Botanical Magazine.

Dr. Ferris, besides other professional publications, was the author of a work entitled "A General View of the establishment of Physic as a Science in England."

The Rev. William Holwell Carr was a gentleman of refined and cultivated taste, and a liberal patron of the fine arts; he has established no slight claim upon the gratitude of his country by the bequest of his collection of exquisite pictures to the British Museum, whose Council have thought it most advisable, for their better preservation and security, as well as for the furtherance of that gentleman's views in making such a magnificent present to the nation, to deposit them in the British Gallery.

The Earl of Darnley was a liberal patron of the Fine Arts, and a zealous friend of all useful public institutions: and he gave a most convincing proof of the interest which he felt in the promotion of natural knowledge, by the formation and maintenance of a noble collection of rare and curious plants and animals.

Mr. Thomas Hope, the justly celebrated author of *Anastasius*, and Dr. Magee, Archbishop of Dublin, author of the great work upon the Atonement, are names not likely to be soon forgotten in the literary history of this country; but they require no further notice from me, as their labours are altogether foreign to the pursuits of this Society.

The only Foreign Member whose death we have to record is the celebrated Sömmerring, who died lately at Frankfort, his native city, full of years and honour. His numerous and most splendid anatomical works, particularly those on the different organs of sense, have long placed him at the head of the anatomists of Germany, and probably of Europe.

I cannot conclude this Address, Gentlemen, without again requesting you to accept my assurances of the sense which I entertain of the high honour of presiding over this Society, and of my determination to promote its interests to the utmost of my power and ability, in case it should be your pleasure to confide them again to my keeping, by electing me a second time to fill this chair.

Report of the Council to the Anniversary Meeting on St. Andrew's Day, 1831.

The Council, to whom the Society has confided the management of its affairs during the past year, in giving an account of the manner in which they have endeavoured to discharge that trust, have in the first place to congratulate the Society upon the honour which has been conferred upon them by His present Majesty's having been graciously pleased to become the Patron of the Society, and by his having expressed a warm interest in its prosperity.

They wish, in the next place, to call the attention of the Society to the alterations they have made in the Statutes. It has for some time past appeared desirable that the Statutes should undergo a thorough revision with a view to their improvement and adaptation to the present state of the Society. The Council, anxious to accomplish this important object in the most effective manner with respect to the permanent interests of the Society, solicited the assistance of such of the Fellows as seemed to be most able, as well as willing, to give them the benefit of their valuable advice and co-operation in the performance of this difficult task. Three members of their own body having, on this occasion, intimated their inability to attend, from the pressure of other avocations, and their wish, in consequence, to retire from the Council, the Society was called upon to supply the vacancies occasioned by these resignations. The number of the Council being completed by these new elections, twenty-one other Fellows (a number equal to their own) were selected from the Society, for the purpose of composing with the Council a Committee of forty-two members for preparing the requisite emendations in the Statutes, and also for inquiring whether it might be advisable to propose any alterations in the existing Charter of the Society.

This Committee held several meetings for the discussion of these subjects. It was found upon investigation, that several improvements which were suggested could not be effected consistently with the powers granted by the present Charter: and it was finally agreed that the advantages to be expected from those changes would be more than compensated by the difficulties and expenses that would attend the procuring of a new Charter. The Committee, therefore, proceeded to direct their attention to the effecting of such emendations of the Statutes as were compatible with the powers granted by the Charter, and which appeared to afford ample means for the introduction of much improvement. Many of the Statutes which, in the course of time, had become no longer con-

formable to the practice, or adapted to the existing circumstances of the Society, were rescinded; many which required an alteration in their form were remodelled; the language in which the whole was expressed was rendered more uniform, consistent and precise; and several new regulations were introduced, calculated, in the opinion of the Committee, to promote the objects and the welfare of the Society. The result of the labours of the Committee has been the amended edition of the Statutes in the form in which they have since been printed, after having been adopted by the Council, according to the forms prescribed in the Charter, and in the former Statutes of the Society. The principal alterations that have been made in the Statutes are the following:

1. The number of Fellows whose signatures are required as proposing and recommending a candidate for election into the Society is now extended to six instead of three.

2. The times of election are now limited to the first ordinary meetings of the Society in December, February, April and June.

3. Such persons as shall in future be elected Fellows will be allowed to pay annual contributions of four pounds, as long as they shall continue to be Fellows of the Society; but no bonds, as heretofore, shall be required for enforcing these payments.

4. Lists of persons whom the Council recommend to the Society for election as Council and Officers for the ensuing year are to be prepared previous to the anniversary meeting.

5. The process of balloting for the Council and Officers at the anniversary meeting has been simplified by the employment of a single balloting list for that purpose.

6. An abstract of the Society's accompts in each year is to be prepared by the Treasurer, and printed for the use of the Fellows.

7. The duties of the Assistant Secretary and of the Librarian are now united in one person, and the office of Housekeeper is abolished.

8. Provision has been made for calling special general meetings of the Society whenever they may appear to be necessary.

9. A great extension has been given to the time during which the Library shall be accessible to the Fellows. It is now ordered to be open every day, Sundays excepted, from eleven o'clock in the morning till four in the afternoon, excepting on Good Friday, and during Easter, Whitsun and Christmas weeks.

10. Provision has been made for an annual inspection of the Library at a stated period.

The new Statutes are now printed for the use of the Fellows, and may be had on application to the Assistant Secretary.

Since these Statutes have been framed, the Council have besides adopted several specific regulations calculated to facilitate the borrowing of books out of the Library, and for ensuring their regular return at the proper period. They have also framed regulations respecting the loan of instruments belonging to the Society, with a view to the accommodation of Fellows wishing to borrow them, and consistently with their preservation in good condition.

Pursuant to the agreement entered into with the Trustees of the British Museum respecting the exchange of the Arundel manuscripts for books suited to the objects of the Society, the sum of £956 Os. 3d. was in July last received from the Trustees of the Museum, with the condition annexed, that the money was to be expended exclusively in the purchase of books, and that a list of the books so purchased should be sent to the Trustees. Nearly the whole of this sum has since been applied in the manner stipulated for, and the Library of the Royal Society has in consequence been enriched by a very large addition of works on scientific subjects, which had long been wanting for the supply of its deficiencies in those branches of knowledge, the promotion of which is more particularly the object of the Royal Society.

A communication has lately been received from the Trustees of the British Museum, stating that they expect to realize at least the greater part of the remaining sum due to the Royal Society, on account of the Arundel MSS. by the sale of duplicate books, in the course of the ensuing spring; and that the money so realized will be paid over without delay into the hands of the Treasurer of the Royal Society.

The Council have in the course of the last summer ordered a thorough inspection of the Library, and the accurate completion of its Catalogue, a task for the proper execution of which considerable time and labour have been required, and which is now nearly completed. With the kind assistance of Mr. Dollond, a list has also been made of the philosophical instruments belonging to the Society, and ordered to be printed for the use of the Fellows.

The increase of the Library and the probability of its future extension have rendered it extremely necessary that a more enlarged space should be obtained than that afforded by the apartments at present occupied by the Society. On this account the Council have reason to congratulate the Society on the acquisition they have lately made, by the favour of the Lords Commissioners of His Majesty's Treasury, on the application of His Royal Highness the President, of the rooms lately occupied as the Privy Seal Office.

On a representation made to the Council of the advantages to be expected from the application of the optical principle developed by Mr. Barlow, to the construction of a telescope of large dimensions, the Council appointed a Committee of inquiry into this subject; and having received from them a report favourable to the success of the measure, have given orders to Mr. Dollond to execute a telescope of that description under the superintendence of Mr. Barlow.

The Council have also to announce that they have placed the papers containing the magnetical observations made by the late lamented Capt. Foster in his recent voyage of discovery (and which have been transmitted to the Royal Society by the Lords Commissioners of the Admiralty), in the hands of Mr. Christie, who has obligingly offered to examine them, and has undertaken to condense them with a view to publication by the Society.

The Council being desirous of obtaining authentic documents respecting the tides, applied to the Admiralty for accounts of the rise and fall of the sea, and the exact periods of high and low water at the different sea-ports. Orders have in consequence been given to the proper officers of the Dock-yards at Woolwich, Sheerness, Portsmouth, and Plymouth, to make these observations, and returns have already been received from those places. The Chairman and Directors of the London Dock Company have presented to the Society the books containing a complete series of original observations on the tides, referred to in a paper read to the Society on that subject by Mr. Lubbock; for which favour the Council have returned suitable acknowledgements.

Considerable uncertainty having prevailed with regard to many points relating to the powers entrusted to the Society of conferring certain honorary rewards, and also as to the principles which should guide them in making the several awards of those honours, the Council appointed a Committee for considering the whole of this subject. The Committee, in the execution of this task, have made a diligent search for all the documents relating to these subjects, including the extracts from wills and other authorities, and the resolutions which have from time to time been made by the Council relating to the medals; and have directed that separate lists should be made out of all the persons who have received the honorary rewards bestowed by the Society, specifying the respective dates and subjects for which they were awarded. Their exertions have been ably and diligently seconded by the Assistant Secretary; and the Council have directed that the account which Mr. Hudson has drawn up shall be printed for the use of the Fellows.

The Council, on the recommendation of the Committee, have adopted the following regulations as to the mode of making the several awards entrusted to them.

1. The Copley Medal shall be awarded to the living author of such philosophical research, either published or communicated to the Society, as may appear to the Council to be deserving of that honour. The particular object or subject of research, on account of which the medal is awarded, shall be specified in making the award. No limitation shall exist either as to the period of time within which that research was made, or to the particular country to which its author may belong. It shall not be awarded to any person who is a member of the Council at the time when the award is made. The medal may, as was formerly done, be given more than once to the same person, if the Council deem it expedient so to mark their high sense of the merit of the author. The medal shall, as far as circumstances permit, be awarded annually.

2. No change is made in the mode of awarding the Royal medals, formerly resolved upon by the Council.

3. At the first meeting of the Committee of papers held in each year, some one paper then in the hands of the Secretaries, and intended to be read to the Society, shall be selected as the Bakerian Lecture for that year.

Inconvenience having arisen from the collection which the Porter has hitherto been in the habit of making from the Fellows of gratuities for the delivery of the Lists of the Society, the Council have now ordered that from the day of the next anniversary, he shall receive, in lieu of such gratuities, and of his former salary, a salary at the rate of £60 per annum.

The Copley Medal has been adjudged to Professor Airy of Cambridge, for his papers on the construction of the Achromatic Eye-pieces of Telescopes, and on the Achromatism of Microscopes; on the Spherical Aberration of Eye-pieces, and for his other papers on optical subjects in the Cambridge Philosophical Transactions.

The rules for the practical construction of eye-pieces, which were chiefly formed by the elder Dollonds, were probably deduced by repeated trials, conducted with the usual skill and sagacity of those great opticians, rather than by any very accurate reference to their mathematical theory: in whatever manner, however, they were discovered, they have continued to be adopted by opticians with very little alteration since that time.

The correction of the spherical and chromatic aberration of eye-pieces is at least as important in practice as those of object-glasses; and whilst the theory of the latter has been more than once subjected to a complete analysis, that of the former has been almost altogether neglected. The elaborate and complicated formulæ of Euler are altogether useless for the present constructions; and the more practical investigations of Boscovich, though opening the way to more accurate results, have failed to satisfy the required conditions. Professor Airy, by a more accurate analysis of the theory of oblique pencils of rays, and by connecting his investigations more strictly with the practical conditions of the problem to be solved, has been enabled not merely to satisfy the common constructions and the rules for effecting them, but likewise to point out other constructions with their corresponding rules; and though such constructions have been found, upon trial, to be at least not superior to those which are already in use, it must always be considered as an important step in the advancement of science, that theory should be at least coextensive with practice, and should become a leader and a guide to the latter, instead of a follower in its train. But though the Council have selected the papers on the theory of the correction of the chromatic and spherical aberration of eye-pieces, as forming the principal ground of their decision, yet they are anxious to combine with them other papers in the same Transactions, as deserving of particular commendation, and as showing the profound acquaintance of their author with every branch of optical science. Amongst these may be mentioned the paper on the Double Refraction of Quartz, which is of very recent publication, inasmuch as it affords one of the most striking *à posteriori* proofs which have hitherto been discovered of the truth of the undulatory theory of light; a most difficult mathematical investigation, essentially founded upon that theory, leads him to expect the appearance of phenomena of great beauty and intricacy, as the result of certain experi-

ments which are found upon examination to be almost mathematically exact. It is by such tests, and many others reproducible, that the truth of the theory, which was established and developed by the genius of Young and of Fresnel, becomes established upon evidence scarcely inferior to that of universal gravitation.

The Society next proceeded to the Election of the Council and Officers for the ensuing year, when the following was declared to be the list:—

President.

His Royal Highness the Duke of Sussex, K.G.

Treasurer.

John William Lubbock, Esq. M.A.

Secretaries.

Peter Mark Roget, M.D. John George Children, Esq.

Foreign Secretary.

Charles Konig, Esq.

Other Members of the Council.

Peter Barlow, Esq.	William George Maton, M.D.
John Bostock, M.D.	Roderick Impey Murchison, Esq.
Rev. William Buckland, D.D.	Rev. George Peacock, M.A.
Samuel Hunter Christie, Esq. M.A.	George Rennie, Esq.
Rev. Henry Coddington, M.A.	Captain William Henry Smyth,
Charles Daubeny, M.D.	R.N.
George Dollond, Esq.	Nicholas Aylward Vigors, Esq.
Davies Gilbert, Esq. M.A.	M.A.
Joseph Henry Green, Esq.	Rev. William Whewell, M.A.